

AN SEM STUDY OF LEAF SURFACE PUBESCENCE IN THE SOUTHEASTERN TAXA OF PERSEA¹

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Scanning electron microscope (SEM) studies of anatomical and morphological structures are rapidly appearing in the systematic literature. Although most of these studies have dealt with spore or pollen grain architecture, Faust and Jones (1973), in *Vernonia*, and Mulligan (1971), in *Draba*, recently used the SEM for systematic purposes in examining leaf trichomes. For the most part, however, SEM studies of anatomical structures associated with leaf surfaces, i.e., distribution and morphology of hairs, glands, stomata, etc., have been generally ignored by systematists.

SEM studies of leaf pubescence were included as part of a biosystematic study of the genus *Persea* (Lauraceae) in the southeastern United States (Wofford, 1973). On the basis of these and other data, *P. palustris* (Raf.) Sarg., *P. humilis* Nash, and *P. borbonia* (L.) Spreng, are recognized as distinct species and *P. littoralis* Small is considered to be nothing more than a coastal dune ecotype of *P. borbonia*. According to Small (1903), the leaf blades of *P. borbonia* are "finely reticulated beneath and mainly over thrice as long as wide" while the leaf blades of *P. littoralis* are "not reticulated and mainly about twice as long as wide." These differences, however, are inconsistent and clearly represent morphological adaptations to the environmental conditions operative on coastal dunes.

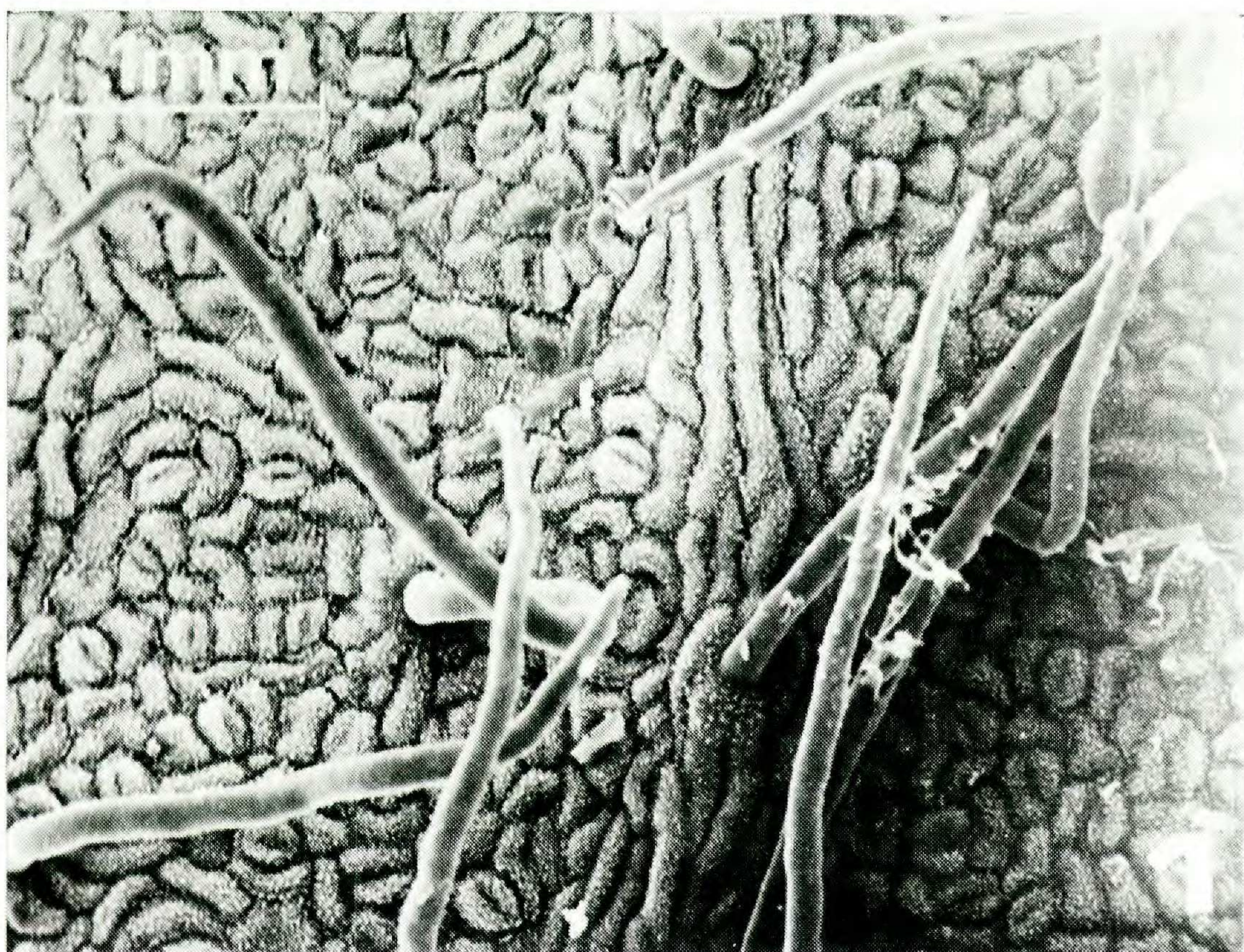
METHODS

Lower leaf surfaces (ca. 5 mm²) were mounted with plastic cement to standard ¾ inch aluminum studs. The mounted specimens were coated with vaporized carbon and gold *in vacuo* using a Denton vacuum coater equipped with a random rotating head. The specimens were viewed on an AMR model 900 Scanning Electron Microscope provided by the Department of Chemical and Metallurgical Engineering, The University of Tennessee, Knoxville.

DISCUSSION

The relatively small, unicellular, cupreous, filiform leaf trichomes in the southeastern taxa of *Persea*, provide the most reliable set of characters for readily distinguishing species. Several characters elucidated using the SEM,

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e.g., trichome length and density, are not adequately resolved with the dissecting microscope.

Persea palustris (Fig. 1), the most widespread and commonly encountered species, occurs throughout the Coastal Plain from eastern Virginia south to Florida and west to eastern Texas. This species possesses lanate trichomes that easily separate it from the sericeous type of *P. humilis* (Fig. 2) and the strigose type of *P. borbonia* (Fig. 3). The trichomes of *P. palustris* are moderately distributed over the lower leaf surface.

Persea humilis (Fig. 2), a central Florida endemic, is restricted to the evergreen oak-sand pine-scrub community. The moderately falcate, sericeous hairs of this species resemble those of *P. borbonia* (Fig. 3) with the exceptions of being denser and much longer. Also, the trichomes of *P. humilis* are about half as long as those of *P. palustris*. The shiny, cupreous trichomes of this species provide a reliable field character and make the common name "silk bay" an understandable one. As Nash (1895) stated, "*Persea humilis*, a most beautiful little shrub, makes itself very conspicuous by its bright brown silky pubescence, which is noticeable a long way off."

Persea borbonia (Fig. 3) has a distribution similar to that of *P. palustris* except that it is absent from Virginia and is restricted primarily to the outer Coastal Plain. The strigose hairs of this species, as previously stated, resemble those of *P. humilis* but are shorter and much less dense.

Persea littoralis, *sensu* Small (Fig. 4), now considered only a sand dune variant of *P. borbonia*, was found to show no differences in pubescence type, length, and density from that of *P. borbonia*.

In a statistical analysis of trichome length, using the Duncan's Multiple Range Test, Wofford (1973) found significant differences among all three species but no differences between *P. borbonia* and its sand dune ecotype (*P. littoralis*). Mean values (mm.) for each taxon are: *P. littoralis*, 0.14; *P. borbonia*, 0.16; *P. humilis*, 0.26; and *P. palustris*, 0.58. Intraspecific variations in trichome density were observed but are considered to be a function of age rather than being genetically based.

The pubescence type of *P. palustris* is quite distinct from that of the other taxa examined in being much longer and held in an upright position. The hairs of *P. borbonia* (including *P. littoralis*) and *P. humilis* are similar in type but are denser and much longer in *P. humilis*. It is not the intent of this paper to suggest one-character taxonomy but rather to point to the taxonomic and systematic potential of SEM leaf surface studies since the specimen can be more critically examined and the SEM micrographs are far superior to other methods of illustration.

Fig. 1-2. Scanning electron micrographs of *Persea* pubescence. Fig. 1, *P. palustris*. Fig. 2, *P. humilis*.



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Fig. 3-4. Scanning electron micrographs of *Persea* pubescence. Fig. 3, *P. borbonia*. Fig. 4, *P. littoralis*, *sensu* Small.